

Claims

What is claimed is:

- 1 1. A modular platform cooling apparatus, comprising:
2 at least one plenum associated with the apparatus; and
3 a first and a second fan module configured to removably and independently
4 engage the plenum.
- 1 2. The modular platform cooling apparatus of Claim 1, wherein the first and second
2 fan modules each include a plurality of fans arranged in a matrix array.
- 1 3. The modular platform cooling apparatus of Claim 2, wherein at least one of the
2 first and second fan modules includes a matrix array of four fans positioned in a 2-
3 across by 2-deep in-plane relationship.
- 1 4. The modular platform cooling apparatus of Claim 2, wherein at least one of the
2 first and second fan modules has six fans positioned in a 3-across by 2-deep in-plane
3 relationship.
- 1 5. The modular platform cooling apparatus of Claim 2, wherein the fans have a
2 center hub of a certain diameter and the fans positioned in the 2-deep relationship are
3 separated by a distance that is proportional to and a function of the diameter of the hub.

1 6. The modular platform cooling apparatus of Claim 1, wherein at least one of the
2 first and second fan modules may be removed from the at least one plenum while the
3 other fan module continues to provide airflow through a modular platform.

1 7. The modular platform cooling apparatus of Claim 6 wherein the apparatus further
2 comprises circuitry designed to allow the second fan module to be removably added to
3 the apparatus while the apparatus, including the first fan module, is in operation.

1 8. The modular platform cooling apparatus of Claim 6, wherein the first fan module
2 is designed to provide sufficient airflow capacity to cool $(y/x)m$ modular platform boards
3 at a specified capacity, where y equals the total number of side-by-side fans in the first
4 fan module and x equals the total number of fans positioned side by side across an
5 aggregate width of the modular platform, and m equals the total number of modular
6 platform boards.

1 9. The modular platform cooling apparatus of Claim 8, wherein the first fan module
2 will continue to provide airflow through the modular platform to support m modular
3 platform boards and a capacity greater than 50% when the second fan module has
4 been removed from the plenum.

1 10. The modular platform cooling apparatus of Claim 1, wherein the first and the
2 second fan modules, when operating in conjunction with the other, are designed to

3 provide sufficient airflow to cool 2m modular platform boards, where m equals the total
4 number of modular platform boards.

1 11. The modular platform cooling apparatus of Claim 1, wherein the modular platform
2 is at least part compliant with a standard and includes:

3 a width dimension for the at least one plenum that is within a dimension
4 requirement of the standard; and
5 a cooling performance that is within a modular platform board cooling
6 requirement of the standard.

1 12. The modular platform cooling apparatus of Claim 11, wherein the standard is
2 PICMG 3.0 ATCA, and the width dimension requirement is less than or equal to 440
3 mm, and wherein the aggregate width of the first fan module and the second fan module
4 is less than or equal to 440 mm.

1 13. The modular platform cooling apparatus of Claim 12, wherein the standard is
2 PICMG 3.0 ATCA, and the cooling requirement is maintaining a less than or equal to
3 10-degrees Celsius temperature increase per modular platform board, where each
4 modular platform board can generate up to 200 Watts.

1 14. The modular platform cooling apparatus of Claim 13, wherein the shelf has up to
2 sixteen modular platform boards and the first fan module and the second fan module

- 3 provide enough airflow to keep the temperature increase across any modular platform
4 board to less than or equal to 10 degrees Celsius.

- 1 15. A Modular platform, comprising:
2 a plurality of modular platform boards;
3 at least one plenum coupled to the modular platform; and
4 a first and a second fan module configured to removably and independently
5 engage the plenum.

- 1 16. The modular platform of Claim 15, wherein the first and second fan modules
2 each include a plurality of fans arranged in a matrix array.

- 1 17. The modular platform of Claim 16, wherein at least one of the first and second
2 fan modules includes a matrix array of four fans positioned in a 2-across by 2-deep in-
3 plane relationship.

- 1 18. The modular platform of Claim 16, wherein at least one of the first and second
2 fan modules has six fans positioned in a 3-across by 2-deep in-plane relationship.

- 1 19. The modular platform of Claim 16, wherein the fans have a center hub of a
2 certain diameter and the fans positioned in the 2-deep relationship are separated by a
3 distance that is proportional to and a function of the diameter of the hub.

1 20. The modular platform of Claim 16, wherein at least one of the first and second
2 fan modules may be removed from the at least one plenum while the other fan module
3 continues to provide airflow through the modular platform.

1 21. The modular platform of Claim 20, wherein the modular platform further
2 comprises circuitry designed to allow the second fan module to be removably added to
3 the apparatus while the modular platform, including the first fan module, is in operation.

1 22. The modular platform of Claim 20, wherein the first fan module is designed to
2 provide sufficient airflow capacity to cool $(y/x)m$ modular platform boards at a specified
3 capacity, where y equals the total number of side-by-side fans in the first fan module
4 and x equals the total number of fans positioned side-by-side across an aggregate width
5 of the modular platform, and m equals the total number of modular platform boards.

1 23. The modular platform of Claim 22, wherein the first fan module will continue to
2 provide airflow through the modular platform to support m modular platform boards and
3 a capacity greater than 50% when the second fan module has been removed from the
4 plenum.

1 24. The modular platform of Claim 16, wherein the first and the second fan modules,
2 when operating in conjunction with the other, are designed to provide sufficient airflow
3 to cool $2m$ modular platform boards, m equals the total number of modular platform
4 boards.

1 25. The modular platform of Claim 16, wherein the modular platform is at least part
2 compliant with a standard and includes:

3 a width dimension for the at least one plenum that is within a dimension
4 requirement of the standard; and
5 a cooling performance that is within a modular platform board cooling
6 requirement of the standard.

1 26. The modular platform of Claim 25, wherein the standard is PICMG 3.0 ATCA,
2 and the width dimension requirement is less than or equal to 440 mm, and wherein the
3 aggregate width of the first fan module and the second fan module is less than or equal
4 to 440 mm.

1 27. The modular platform of Claim 26, wherein the standard is PICMG 3.0 ATCA,
2 and the cooling requirement is maintaining a less than or equal to 10-degrees Celsius
3 temperature increase per modular platform board, where the modular platform board
4 can generate in excess of 200 Watts.

1 28. The modular platform of Claim 27, wherein the shelf has up to sixteen modular
2 platform boards and the first fan module and the second fan module provide enough
3 airflow to keep the temperature increase across any modular platform board to less than
4 or equal to 10 degrees Celsius.

1 29. The modular platform of Claim 16, wherein the modular platform includes an intake
2 plenum and an exhaust plenum.

1 30. The modular platform of Claim 29, wherein the first and second fan modules are
2 positioned in the exhaust plenum.

1 31. The modular platform of Claim 16, wherein the first and second fan modules are
2 configured as dual plenum fan modules, having a first portion acting as an intake for an
3 adjacent modular platform and a second portion acting as an exhaust for the modular
4 platform.

1 32. The modular platform of Claim 31, wherein the height of the first and second fan
2 modules is less than or equal to 2U.